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FINAL REPORT

SEQUENCING OF EMERGENCY PROCEDURE TRAINING DURING THE PRIMARY PHASE OF IERW

by

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DES 83-4

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER DES 83-4 / 2. GOVT ACCESSION NO. AD-A166384	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Sequencing of Emergency Procedure Training During the Primary Phase of the Initial Entry Rotary Wing Course	5. TYPE OF REPORT & PERIOD COVERED Final Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) CPT Michael J. Juneau DAC William A. Rowe	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Directorate of Evaluation and Standardization US Army Aviation Center, ATTN: ATZQ-ES-E Fort Rucker, AL 36362	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Directorate of Evaluation and Standardization US Army Aviation Center Fort Rucker, AL 36362	12. REPORT DATE August 1983 13. NUMBER OF PAGES 64
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

~~Distribution to US Army Service School Evaluation Directorates, TRADOC and MILPERCEN~~

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Emergency Procedure Training (EPT), Flight Training Guide (FTG), Instructor Pilot (IP), Primary Phase, Contact Phase, Analysis of Variance, Questionnaire

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

~~The purpose~~ of ~~the~~ this study ~~was to~~ determine if delaying emergency procedure training to a later flight hour level would reduce the training time required to teach emergency maneuvers.

An alternate flight training sequence that delayed emergency training was developed. Students from three Initial Entry classes were randomly selected and placed into two groups. One group received training using a delayed emergency training sequence and the other group received training using the

current sequence. Comparisons between the two groups were made from data collected during their Primary Phase of flight training.

The evaluation produced the following major findings:

a. No significant difference existed between the test and control group on the number of emergency maneuver iterations required to pass the Primary Phase flight evaluation.

b. The hour level that students in the test group were prepared to pass the Primary Phase checkride was not significantly different from that of the control group.

c. There was no significant difference in the Contact Phase checkride grades between the two groups.

d. The performance of students on individual maneuvers during the Primary Phase checkride was not shown to be significantly different between the test and control groups.

e. Instructor pilots believe student pilot safety will suffer and weak students will be identified much later if emergency training is delayed until the twelve hour level.

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ACKNOWLEDGEMENTS

This evaluation was conducted by the Evaluation Division, Directorate of Evaluation and Standardization, United States Army Aviation Center, Fort Rucker, Alabama. The evaluation effort depended upon the technical assistance and support of many individuals. Significant contributions to the study were made by the following personnel:

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d. Personnel from the Department of Flight Training and Aviation Contractor Employees, Inc., who made significant contributions to the evaluation include:

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ABSTRACT

1. The United States Army Aviation Center's Directorate of Evaluation and Standardization conducted an evaluation of the sequencing of emergency procedure training used during the Initial Entry Rotary Wing Course. The purpose of the evaluation was to determine if delaying emergency procedure training to a later flight hour level would reduce the training time required to teach emergency maneuvers.

2. A panel of subject matter experts developed an alternate flight training sequence for the evaluation. Students from three Initial Entry classes were randomly selected and placed into two groups. One group received training using the alternate training sequence that delayed emergency training to the twelve hour level. The other group received training using the current method which begins emergency training around the four hour level. Comparisons between the two groups were made from data collected during the test.

3. The evaluation produced the following major findings:

a. There was no significant difference between the test and control group on the number of emergency maneuver iterations required to pass the Primary Phase flight evaluation.

b. The hour level that students in the test group were prepared to pass the Primary Phase checkride was not significantly different from that of the control group.

c. There was not a significant difference in the performance of students on individual maneuvers, during the Primary Phase final checkride, between the test and control group.

d. A significant difference did not exist between the two groups in their Contact Phase checkride grades.

e. Instructor pilots believe student pilot safety will suffer and weak students will be identified much later if emergency training is delayed until the twelve hour level.

1. INTRODUCTION.

a. Problem. To determine if delaying emergency procedure training to a later flight hour level than programmed in the current Flight Training Guide (Feb 80) used in the Primary Phase of the Initial Entry Rotary Wing Course, will reduce the training time required to teach emergency procedure maneuvers.

b. Impact of Problem. If a decrease in flight training time required for emergency procedure training can be realized by delaying the introduction of emergency training, additional emphasis can be placed on normal aircraft procedures. This could increase effectiveness of available flight training time and enable USAAVNC to produce a more proficient aviator.

c. Background. The current Flight Training Guide (FTG) used in the Primary Phase of the Initial Entry Rotary Wing Course (IERW) allows Instructor Pilot's to begin emergency procedure training as early as the fourth dual flight period. This corresponds to approximately the four hour level for most students. The effects of conducting emergency procedure training at this early hour level in the development sequence of a pilot has not been formally studied at USAAVNC. Introducing emergency maneuvers before a student is familiar with normal maneuvers or comfortable in the aircraft, may require an inordinate amount of time to be spent on emergency maneuver training, thereby reducing the students overall performance. In a flight training program that is based upon fixed hour levels, the extra time required for emergency procedure training reduces training time available for normal maneuvers. However, it must be recognized that introducing emergency procedure training early in the flight training sequence could have beneficial effects on a student's learning progression. Emergency procedure training may have some positive habit transfer with normal maneuvers. This could actually enhance a student's ability to conduct normal maneuvers and increase his overall performance.

In December 1982, the Director, DES, tasked the Evaluation Division to evaluate the effects of sequencing emergency procedure training to a later flight hour level than programmed in the current Flight Training Guide (Feb 80). The evaluation attempted to increase the training effectiveness of IERW by evaluating a particular training approach used during the course. The Evaluation Division conducted the evaluation in accordance with the systems approach to training with the findings and recommendations submitted to DTD for consideration and action as necessary.

To effectively evaluate the stated tasking, an alternate training sequence, or test sequence, was required that delayed the introduction of emergency procedure training during the Primary Phase of IERW. The Evaluation Division organized a panel of Subject Matter Experts that assisted in the development of the test sequence. A report on the test sequence was staffed through DTD, DOTD and CAP. Minor changes were incorporated in the sequence due to comments received during the staffing. For a complete report on the development of the test sequence, see Appendix C.

On 18 February 1983, the Commanding General, USAAVNC, was briefed on the test sequence and a proposal to evaluate the sequence to address the stated problem. The CG approved the evaluation and the test was subsequently started on 24 February 1983.

2. SCOPE. The project was limited to addressing the stated problem. It was not intended to determine the validity of teaching the emergency maneuvers programmed in the current FTG or to question the performance standards established for these maneuvers.

3. ASSUMPTIONS.

a. The sequencing of academic instruction will not affect the project results.

b. The current standard establishing the minimum proficiency level for each flight maneuver is appropriate.

c. The current task performance measures and learning objectives will remain the same for the resequenced training.

d. Established proficiency requirements must be met before a student may solo.

e. Resequencing emergency procedure training will not significantly interfere with the aviator's long term retention of the skills required to avoid potential mishaps.

f. Students from the control group and the test group will receive the same evaluation at the end of the Primary Phase.

NOTE: Control Group refers to students instructed using the current FTG sequence - See Appendix C, Enclosure 2. Test Group refers to students instructed using the test sequence - See Appendix C, Enclosure 1.

g. The same flight instruction methods will be used for both the test group and the control group.

h. Current standards establishing minimum proficiency levels for flight maneuvers will be used by both the control group and the test group.

4. OBJECTIVES. The following objectives were established to evaluate the effects of delaying emergency procedure training.

a. Objective 1. Compare the number of iterations required for a student to reach the proficiency standards, outlined in the Flight Training Guide, on emergency maneuvers between the control group and the test group.

b. Objective 2. Compare the hour level that students are prepared to pass a Primary Phase end-of-stage evaluation checkride of the test group with that of the control group.

c. Objective 3. Compare student proficiency on emergency maneuvers of the test group with that of the control group by evaluating the Primary Phase end-of-stage checkride performance on each emergency maneuver.

d. Objective 4. Compare the overall proficiency of the test group with that of the control group by evaluating the Primary Phase end-of-stage checkride performance.

e. Objective 5. Compare the opinions of instructor pilots on the management and administration of the test sequence with that of the current sequence.

f. Objective 6. Compare the UH-1 Contact Phase checkride grades of the test group with those of the control group.

5. GENERAL METHODOLOGY.

a. Design. The basic design for the evaluation was to compare the results of a control group receiving instruction using the current emergency procedure training sequence (Appendix C, Encl 2) with that of a test group receiving instruction using the test sequence (Appendix C, Encl 1.) Comparisons were made on each objective listed in paragraph 4 of this report. Explanations of the statistical analyses applied to each objective are provided in the Results Section of this report.

b. Sampling. The evaluation involved three IERW classes with a total student population of 267 students. Students from each class were randomly selected and placed in a test group and a control group. A breakdown of students involved in the test follows. (For a detailed explanation of the sample selection procedures, see Appendix D.)

	Control	Test
Class 83-15/16	43	46
Class 83-17/18	43	46
Class 83-19/20	37	52
TOTAL	123	144
Students with prior flight time	26	25

NOTE: Students setback and allied students were not included in the statistical analysis.

c. Data Collection. Data relating to the objectives in paragraph 4 were collected through four separate instruments.

(1) Primary Flight Training Daily Record (See Appendix E): Was used to collect data for Objectives 1 and 2 as well as some descriptive data. Information obtained from this form included:

(a) Total number of iterations required for a student to pass (70%) the end-of-stage checkride on each emergency maneuver.

(b) Days and hours required for a student to reach a proficiency level to pass (70%) the end-of-stage checkride.

(c) Total solo and dual flight hours flown during the Primary Phase.

(d) Total days required for a student to complete the Primary Phase.

(e) Total flight hours and days prior to student solo.

(f) Total training days.

(g) Total emergency procedure maneuver iterations conducted during the Primary Phase of training.

(h) Miscellaneous information.

(2) Primary Phase evaluation gradeslip. The gradeslip from the end-of-stage evaluation administered by the Contract Evaluation Branch was used to evaluate Objectives 3 and 4. The numerical score given for each maneuver, as well as the overall grade, was used in the analysis. This provided a greater scoring range and incorporated a weighted score for each maneuver.

(3) IP Questionnaire. Developed and administered by DES and used in the analysis of Objective 5.

(4) UH-1 Contact Phase end-of-stage checkride score. This score was used in the analysis of Objective 6 to compare the performance of both groups during the Contact Phase. Performance during the Contact Phase was used to determine if the sequencing of emergency procedures training in Primary affects the later development of the student.

6. RESULTS.

OBJECTIVE 1: Compare the number of iterations required for a student to reach proficiency standards on emergency procedure maneuvers between the control group and the test group.

METHODOLOGY: The population sample for the analyses relating to the above objective consisted of 229 students. This population was randomly divided into four independent groupings to coincide with the four emergency procedure maneuvers that were evaluated; Hovering Autorotation, Standard Autorotation, Simulated Engine Failure and Autorotation with Turn. Test/Control group proportions and ORWAC/WORWAC proportions were maintained within the groups.

Each group was randomly selected for evaluation of a specific maneuver. There was a twofold purpose to this approach. First, subdividing the population avoided analysis of each maneuver with the same subjects. Such repeated measures can reduce the power of the statistics used and could yield erroneous findings. Secondly, the subgroups permit replication, i.e., it was planned that significant results found with one group would be verified on an independent sample (another subgroup.)

A Two-Way Analysis of Variance statistic was used to compare the test group and control group iterations on each emergency procedure. In addition to analyzing the training sequence factor, the

test statistic compared the differences in ORWAC and WORWAC performance on the maneuvers. This latter comparison was conducted to determine if rank category accounted for performance differences, and if so, if it had any confounding effect on the test and control group comparisons.

FINDINGS: (a) Hovering Autorotations: The test group had an average of 30.37 iterations on this maneuver while the control group averaged 32.79 iterations. There was no statistically significant difference in the number of iterations to proficiency between the test and control groups ($F=.342$, $df=1/51$, $p=.561$). The differences between ORWACs and WORWACs was not significant ($F=.355$, $df=1/51$, $p=.554$) nor was there an interaction effect ($F=2.5$, $df=1/51$, $p=.120$). Table 1-1 contains a detailed summary of the statistical analysis.

(b) Standard Autorotation: The test group had an average of 29.90 iterations to proficiency on this maneuver and the control group averaged 33.52. The differences were not considered to be statistically significant ($F=1.768$, $df=1/49$, $p=.190$). The differences between ORWAC and WORWAC iterations were not significant ($F=1.399$, $df=1/49$, $p=.243$) and there was not a significant interaction effect ($F=.007$, $df=1/49$, $p=.931$). A detailed summary of the statistical analysis is contained in Table 1-2.

(c) Simulated Engine Failure: The test group averaged 21.59 iterations before reaching an acceptable level of proficiency. The control group averaged 30.16 iterations. The differences between the groups on this maneuver proved to be statistically significant ($F=4.612$, $df=1/48$, $p=.037$). Differences between ORWAC and WORWAC performance, in terms of iterations, and interaction effects between the rank factor and training sequence factor were not significant ($F=.212$, $df=1/48$, $p=.647$; $F=.923$, $df=1/48$, $p=.342$, respectively). Replication of the analysis on an independent group confirmed the significant findings of the first comparison ($F=16.385$, $df=1/46$, $p=.001$) with group means again showing the test group averaging fewer iterations (test group = 21.00, control group = 31.64). Table 1-3 and 1-4 contain a detailed summary of the statistical analysis.

NOTE: The simulated engine failure was not a graded maneuver during this evaluation. The maneuver, as written in the FTG, was eliminated during the conduct of the test due to safety related problems with the aircraft. IPs were given alternate guidance on procedures to conduct the maneuver and log the iterations. However, some confusion was associated with this change and the validity of the data received was questionable. The findings associated with this maneuver were not used in developing conclusions relative to the test objectives.

(d) Autorotation with Turn: This is not a graded maneuver in Primary flight training. It is demonstrated to the students and occasionally, if time permits, they have the opportunity to fly the maneuver and to achieve proficiency. The maneuver was included in this evaluation in the hope that enough data could be obtained to accomplish a valid statistical analysis. As it turned out, the sample of students who gained proficiency on this maneuver was too small for the established methodology to be meaningful. Data for the 28 cases available showed the test group with an average of 9.8 iterations and the control group with an average of 11.06. Although these data indicate a smaller number of iterations for the test group, they are, by themselves, inconclusive.

OBJECTIVE 2: Compare the hour level that students are prepared to pass a Primary Phase end-of-stage evaluation checkride of the test group with that of the control group.

METHODOLOGY: A Two-Way Analysis of Variance technique was used to compare the hour levels for the test and control groups. The data from two hundred eighteen students were used, with one hundred nine students in each group. The groups were further broken down by ORWAC and WORWAC categories to account for any effects associated with rank. The criterion data was comprised of IP judgements for each student based upon the students' performance during training.

FINDINGS: There were no significant differences between groups on either the ORWAC/WORWAC factor or the test/control factor. The analysis indicated that the test and control groups were indistinguishable in terms of time required to meet minimum standards for end-of-stage checkride ($F < .001$, $df = 1/214$, $p > .99$).

OBJECTIVES 3 and 4:[1] Compare test and control group proficiency on emergency maneuvers and overall proficiency through analysis of Primary Phase end-of-stage checkride performance.

METHODOLOGY: A Discriminant Analysis was used to compare proficiency of control and test group students on end of Primary Phase checkrides. Data consisted of the numerical scores for the graded maneuvers on the Primary Phase evaluation gradeslip for each student. Variables from the gradeslip that were included in the analysis are shown on the next page.

[1]The above objectives were addressed concurrently by the Discriminant Analysis.

Hovering Autorotation	Steep Approach
Standard Autorotation	Evaluation Grade
90 Degree Hovering Turn	Flight Safety
Normal Takeoff from Hover	Attitude
Traffic Pattern	Knowledge of Procedures
Normal Approach to Hover	Coordination
180 Degree Hovering Turn	Planning and Judgement
Landing from and Takeoff to a Hover	Division of Attention
360 Degree Hovering Turn	Preflight, Cockpit, Postflight Procedures
Simulated Maximum Takeoff	

The Discriminant Analysis approach was used to identify unique performance characteristics attributable to either the test group or control group. A significant and reliable discriminant function would indicate that certain features of the two training sequences produced students that could be placed into identifiably different categories of performance. A consistent positive or negative weighting of the coefficients associated with the discriminant function would determine if the control group or the test group was superior. Inconsistent coefficient weighting would identify positive and negative aspects of each training sequence and could indicate, in spite of a significant function, that neither sequence was more effective than the other.

The evaluation sample was randomly divided into two groups. Group one contained one hundred students and group two consisted of one hundred seven students. Fifty-five cases were excluded during the initial phases of the computer analysis due to missing data for one or more of the variables under consideration. These cases were reintroduced for classification analysis after the discriminant function was computed. Proportions of test and control categories and proportions of ORWAC and WORWAC categories were maintained in both groups. The first group was used for the initial analysis in which the discriminant function was derived. Group two was reserved for a cross validation of the discriminant function in the event that it proved to be significant.

The variables shown above were entered into the analysis through a step-wise approach. The order in which the variables were entered into the analysis was controlled so that the two graded

emergency procedures were considered first, the nine graded normal maneuvers entered the analysis next and the remaining eight variables, which included the checkride grade and other generic data, were entered last. A detailed explanation of the statistical procedure and parameters used in the analysis is provided in Appendix H.

The relevance of the analysis to the effects of delayed emergency procedure training was accomplished through a review of each variable in the equation, the weight or discriminant coefficient assigned to each and the overall success of the discriminant function to correctly place the students into test or control group categories. The last point, i.e., success of the discriminant function, served to determine if the test sequence had a significant impact on the performance of its graduates.

DISCUSSION: The discriminant analysis selected seven variables which, in mathematical combination, were able to discriminate with a significant degree of success between the test and control groups. The variables included one emergency procedure maneuver, four normal maneuvers and two graded areas of general information. Table 1-5 below lists the variables, their standardized canonical coefficients (which reflect the relative importance of the variables), their unstandardized coefficients (which are used in computation of raw discriminant score for each individual) and the cumulative significance of each variable.

TABLE 1-5 - DISCRIMINANT VARIABLE DATA

VARIABLE	STANDARDIZED COEFFICIENT	UNSTANDARDIZED COEFFICIENT	CUMULATIVE SIGNIFICANCE
Standard Autorotation	0.68111	0.0095366	0.0354
Normal Takeoff from a Hover	0.52621	0.2471166	0.0238
Traffic Pattern	-0.52819	-0.2537749	0.0094
Normal Approach to Hover	0.42454	0.009941	0.0122
Landing from Takeoff to a Hover	0.28006	0.1114799	0.0145
Flight Safety	-0.50770	-0.7700036	0.0102
Preflight, Cockpit, Postflight Procedures	0.35311	0.6185664	0.0107
(Constant)		-7.575093	

As the table shows, Standard Autorotation performance was the most powerful discriminator between the students of the two programs of instruction. The positive weight of the coefficient indicates that test group performance was superior. A look at the raw scores for the two groups showed the test group with an average score of 33.67 and the control group with an average score of 30.61 on the Autorotation maneuver.

Normal Takeoff from a Hover was the next most important variable in the equation. It too had a positive weight for its coefficient, thereby identifying another area where the test group performed significantly better than the control group. Test group average for the checkride was 27.50; control group average on the maneuver was 26.74. The difference in scores evident in the first variable averages diminishes somewhat with the second variable averages, with a mere 0.76 difference. Although such a difference may at first appear to be of questionable practical value, the improved significance of the equation indicates that the test group's higher scores had a high degree of consistency within the sample used.

The third variable to enter the equation was Traffic Pattern. Its negative value indicates that, on this maneuver, control group performance was superior to that of the test group. With an average of 25.43 for the test group and an average of 25.72 for the control, we are particularly strained to see any practicable difference in the groups. However, as can be seen in Table 1-5 the addition of the variable to the equation produces a sound improvement in the significance of the discriminant function.

Although the remaining variables in the equation contribute to the statistical significance of the discriminant function, the level of that contribution, from a practical standpoint, is negligible. With Normal Approach to Hover, the findings favor the test group. The difference in group averages is 1.17, yet the cumulative significance actually shows a decrease with the inclusion of this variable. Landing from and Takeoff to a Hover group averages differed by seven tenths of a point and again a decrease in significance is evident, although it remains within acceptable parameters. Flight Safety was graded higher for the control group. The difference between group averages however, amounted to less than eight hundredths of a point. The final variable - Preflight, Cockpit and Postflight Procedures - was positively weighted, but the test group average was superior by less than two tenths of a point and as the table shows, cumulative significance actually decreased.

When applied to the sample from which it was derived, the discriminant function correctly classified almost 67% of the students as test or control group members. With only two categories to choose from, it must be noted that the correct classification of any student had a prior probability of 50%. Thus the discriminant function accounted for 17% more variance than would be expected by chance alone.

The worth of a discriminant function, however, is not so much in how it relates to its initial sample, but how successful it is in discriminating between groups on an independent sample. This requirement served as the basis for randomly splitting the sample population into two sections as was described earlier. Application of the discriminant function to the second half of the evaluation sample resulted in the correct classification of just under 57% of the students. This figure represents considerable shrinkage from the original sample and can most likely be attributed to features of the discriminant function that were based upon erroneous, sample specific correlations.

A look at the second sample grade averages for the variables in the equation permitted the identification of two (of what could be more) maneuvers responsible for the equation's lack of consistency. Standard Autorotation scores shifted slightly in favor of the control group in the cross validation. The control group averaged 32.67 while the test group had an average of 32.33 on this maneuver. Normal Approach to a Hover also shifted in favor of the control group by two tenths of a point. The relationship between test and control group averages for the remaining equation variables was consistent between samples. The extent of the differences between test and control groups also remained very small.

Any equation of this type is expected to experience some shrinkage upon cross validation. The reduction of the function to the point where it accounted for less than seven percent more cases than chance is somewhat extreme and effectively diminishes the discriminant equation to a level where it serves no practical value.

FINDINGS: The discriminant analysis failed to find any meaningful differences between test and control groups. For the initial sample, the analysis selected seven maneuvers as discriminant variables. Both control and test groups appeared to be superior in specific areas. The test group had the larger number of positive features and was dominant from a statistical standpoint. The strength of the discriminant function rested most soundly on Standard Autorotation, Normal Takeoff from a Hover and Traffic Pattern performance. Between the two groups, control group performance was better in the Traffic Pattern maneuver while the test group scored higher on the other two maneuvers. Cross validation of the discriminant equation on a separate sample of test and control group students, however, failed to support these relationships.

<u>OBJECTIVE 5</u>: Compare the opinions of instructor pilots on the management and administration of the test sequence with that of the current sequence.

METHODOLOGY: An opinion survey (Appendix F) was developed and administered by DES to all instructor pilots involved in the test. The first section of the questionnaire (Questions 5-13) was used to compare the responses of the control group IPs with that of the test group IPs. The comparisons were used to determine if IP attitudes and opinions changed after using the test sequence. The second section (Questions 14-19) was completed by test group IPs only. Responses were converted to percentages to determine the opinion of the instructor pilots in selected areas.

FINDINGS: (See Appendix G for response frequencies to each question.)

(a) Time and effort required to teach EPT:

1. No significant findings can be drawn in this area. Although the control group indicated they spent about the same amount of time and effort, test group IPs varied considerably. As indicated by Appendix G, questions 12 and 13, IP opinions changed with use of the test sequence. However, the variance among the responses prevent any definitive findings from being drawn.

2. The elimination of simulated engine failures during the conduct of the test may have caused some confusion for IPs responding to associated questions. However, the vast majority of control group IPs, who were faced with the same situation, indicated they spent about the same time and effort during the identical training cycles.

(b) Hour level to start EPT:

1. IPs believe the 12 hour level is too late in the training sequence to begin EPT. Delaying power-off maneuvers until the 12 hour level apparently causes some anxiety among students because of their perceptions about autorotations. The better students also get bored with normal maneuvers causing a leveling effect on their learning progression.

2. The response averages indicated the optimum time to start EPT is about the seven hour level. However, Figure 1 indicates a bimodal frequency distribution exists for IP opinions on when EPT should begin. One group believes EPT should begin around the 5-6 hour level while another believes it should begin around the 9-10 hour level.

3. IPs feel that the time to start EPT with current constraints is no different from the time to start without constraints.

NOTE: Constraints indicated on the questionnaire were: Solo and dual flight hour requirements, 44 hours required prior to evaluation and the 40 day training cycle.

4. IPs believe that to complete the required training in a 40 day cycle, EPT should begin NLT the 8 hour level.

(c) Hour level to solo: IPs indicated that the latest they can delay student solo and still meet course requirements is the 16 hour level.

(d) Ability to meet programmed requirements: Test group IPs indicated they experience more difficulty in meeting their dual flight hours and other programmed requirements than did the control group IPs.

(e) Student Pilot Safety: IPs believe student pilot safety will suffer if the delayed EPT format is implemented. Comments indicated the main reasons for this dilemma are that students are less alert; become complacent waiting until the 12 hour level to start EPT; and the compressing of flight time in the latter portion of the training cycle.

(f) Identification of Weak Students: IPs feel that weak students will be identified much later. Comments indicated that the difficulty involved with emergency maneuvers enhances the IPs ability to evaluate a student's potential at an earlier hour level.

OBJECTIVE 6: Compare the UH-1 Contact Phase checkride grades of the control group with those of the test group.

METHODOLOGY: One half of the test group and one half of the control group were randomly selected from the total evaluation sample. Proportions of ORWACs and WORWACs in each group were maintained. As a result of this approach, the control group contained 33 WORWACs and 24 ORWACs, and the test group contained 40 WORWACs and 28 ORWACs. The remaining half of the evaluation sample was reserved for replication purposes, had the initial analysis proved significant. The criterion variable was the Contact Phase final checkride (EFF2) grade of each student. A Two-Way Analysis of Variance was used to make the comparisons.

FINDINGS: There was a significant difference between officer and warrant officer groups ($F=5.39$, $df=1/121$, $p<.025$) which is in keeping with findings from earlier unrelated studies. This finding alone has no bearing on the emergency procedure evaluation. There was no significant difference between test and control groups on EFF2 grades ($F=.453$, $df=1/121$, $p>.05$) and no interaction effects were evident between rank category and test/control category ($F=.0323$, $df=1/121$, $p>.05$).

ADDITIONAL FINDINGS: Although the following findings do not correlate directly with a specific objective, they did assist in the analysis of the test sequence.

(a) Descriptive data were collected throughout the test to further compare the performance characteristics of the control group and the test group. The following findings suggest that all areas are equal with the exception of the time students started EPT and when they soloed. These two areas were controlled in the test sequence. (All figures represent the mean response for each group.)

	TEST	CONTROL
Flight hours before starting EPT	11.28	3.17
Flight hours before solo	17.06	14.13
Days before solo	19.82	16.78
Total dual flight hours	33.18	34.08
Total solo flight hours	12.07	11.58
Total flight hours	45.77	46.08
Total weather days	4.82	4.74
Total training days	29.28	29.69

(b) Previous flight experience: (A student was considered to have previous flight experience if he recorded at least 15 hours of previous flight time.)

(1) The delayed emergency sequence had no significant effect on individuals with previous flight experience. There was no significant difference between the test and control groups for students in this category as indicated by the interaction effects of the training sequence factor and experience. ($F=0.497$, $df=1/206$, $p=.481$).

(2) There was a statistically significant difference in the Primary Phase checkride grades between students with and without previous flight experience. Students with previous experience scored higher than those without any previous experience. The effect was true regardless of the training sequence used to instruct the student. ($F=7.148$, $df=1/206$, $p=.008$).

6. CONCLUSIONS.

a. There was no significant difference between the test and control groups in the number of iterations required for students to meet the minimum proficiency standards on emergency maneuvers. On every emergency maneuver analyzed, students in the test group required fewer iterations. However, in no case was this difference considered to be of any significance.

b. The hour level at which test group students were prepared to pass their end-of-stage evaluation was not shown to be different from that of the control group.

c. The individual maneuver scores received during the Primary Phase final checkride did not indicate a significant difference in performance existed between the test and control group.

d. Performance of students in the test group was not shown to be different from that of the control group during the UH-1 Contact Phase checkride. Therefore, there was no evidence that the delayed EPT sequence had any effect on student performance during the Contact Phase.

e. Instructor pilots believe student pilot safety will suffer and weak students will be identified much later if EPT is delayed until the 12 hour level.

7. RECOMMENDATIONS.

a. The current method of sequencing emergency procedure training in the Primary Phase of the Initial Entry Rotary Wing Course continue to be used.

b. The Evaluation Division, DES, conduct briefings on the report findings for all appropriate agencies.

APPENDIX A

TABLES 1-1 THROUGH 1-4

TABLE 1-1

ANALYSIS OF VARIANCE: ITERATIONS TO PROFICIENCY IN HOVERING AUTOROTATION

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIFICANCE OF F
Main Effects	166.308	2	83.154	0.343	0.711
X01-Test vs Control	82.850	1	82.850	0.342	0.561
X02-ORWAC vs WORWAC	86.119	1	86.119	0.355	0.554
2-Way Interactions	606.209	1	606.209	2.500	0.120
X01 X02	606.209	1	606.209	2.500	0.120
Explained	772.516	3	257.505	1.062	0.373
Residual	12364.602	51	242.443		
TOTAL	13137.117	54	243.280		

NOTE: 59 Cases were processed.
4 Cases (6.8%) were missing.

TABLE 1-2

ANALYSIS OF VARIANCE: ITERATIONS TO PROFICIENCY IN STANDARD AUTOROTATION

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIFICANCE OF F
Main Effects	325.151	2	162.576	1.473	0.239
X01-Test vs Control	195.079	1	195.079	1.768	0.190
X02-ORWAC vs WORWAC	154.383	1	154.383	1.399	0.243
2-Way Interactions	0.825	1	0.825	0.007	0.931
X01 X02	0.825	1	0.825	0.007	0.931
Explained	325.977	3	108.659	0.985	0.408
Residual	5407.195	49	110.351		
TOTAL	5733.172	52	110.253		

NOTE: 56 Cases were processed.
3 Cases (5.4%) were missing.

TABLE 1-3

ANALYSIS OF VARIANCE: ITERATIONS TO PROFICIENCY IN SIMULATED ENGINE FAILURE

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIFICANCE OF F
Main Effects	993.941	2	496.971	2.566	0.087
X01-Test vs Control	893.227	1	893.227	4.612	0.037
X02-ORWAC vs WORWAC	41.147	1	41.147	0.212	0.647
2-Way Interactions	178.701	1	178.701	0.923	0.342
X01 X02	178.701	1	178.701	0.923	0.342
Explained	1172.641	3	390.880	2.018	0.124
Residual	9295.980	48	193.666		
TOTAL	10468.621	51	205.267		

NOTE: 58 Cases were processed.
6 Cases (10.3%) were missing.

TABLE 1-4

ANALYSIS OF VARIANCE:
REPLICATION OF ITERATIONS TO PROFICIENCY IN SIMULATED ENGINE FAILURE

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIFICANCE OF F
Main Effects	1416.064	2	708.032	8.371	0.001
X01-Test vs Control	1385.886	1	1385.886	16.385	0.000
X02-ORWAC vs WORWAC	0.944	1	0.944	0.011	0.916
2-Way Interactions	454.032	1	454.032	5.368	0.025
X01 X02	454.032	1	454.032	5.368	0.025
Explained	1870.096	3	623.365	7.370	0.000
Residual	3890.755	46	84.582		
TOTAL	5760.852	49	117.568		

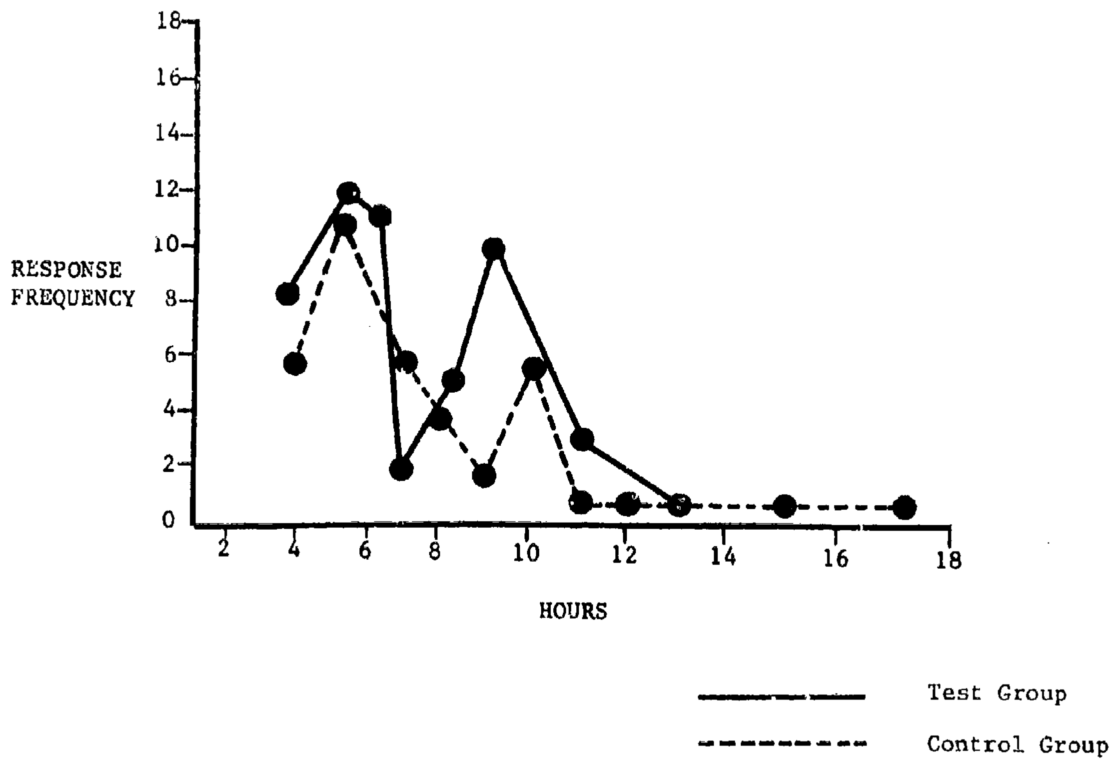
NOTE: 56 Cases were processed.
6 Cases (10.7%) were missing.

APPENDIX B

FIGURES

FIGURE 1

OPTIMUM TIME TO START EPT



APPENDIX C

DEVELOPMENT OF SEQUENCE

Directorate of Evaluation and
Standardization
Fort Rucker, AL 36362
021200 Mar 83

ATZQ-ES-E

SUBJECT: Sequencing of Emergency Procedure Training During the Primary Phase of the Initial Entry Rotary Wing Course

1. PROBLEM.

a. To develop an alternate flight training sequence for the primary phase of the Initial Entry Rotary Wing Flight Training Course (IERW) that can be used to determine the effects of sequencing emergency procedure training at a later flight hour level than programed in the current Flight Training Guide (Feb 80).

b. This study is limited to developing an alternate flight training sequence that will train the same maneuvers to identical standards programed in the current Flight Training Guide (FTG).

c. This study will not determine the validity of teaching the established emergency procedure maneuvers nor will it determine the need to train each emergency procedure maneuver currently programed.

2. ASSUMPTIONS.

a. The sequencing of academic instruction will not affect the project results.

b. The current standard establishing the minimum proficiency level for each flight maneuver is appropriate.

c. The current task performance measures and learning objectives will remain the same for the resequenced training.

d. Established proficiency requirements must be met before a student may solo.

e. Resequencing emergency procedure training will not significantly interfere with the aviator's long term retention of the skills required to avoid potential mishaps.

3. FACTS BEARING ON THE PROBLEM.

a. Fifty hours flight time per student is available for training. (Flight Training Guide, Rotary Wing Aviator Course, Primary Phase, Feb 80.)

b. Emergency procedure training during the evaluation will consist of training on the following maneuvers:

(1) Hovering autorotation.

(2) Standard autorotation.

(3) Simulated engine failure.

(4) Standard autorotation with turn.

4. DISCUSSION.

a. The alternate flight training sequence was developed to evaluate the hypothesis that conducting emergency procedure training after a student becomes more proficient in normal aircraft maneuvers will reduce the number of iterations and time required for emergency procedure training. Confirmation of this hypothesis could result in more productive use of available flight training time and enable the U.S. Army's Aviation Center to produce a more proficient aviator.

b. The basic methodology used to develop the alternate sequence required the following actions:

(1) Review of the Navy's Rotary Wing Flight Training Course Program of Instruction (POI).

(2) Review of the current IERW Primary Phase Flight Training Guide.

(3) Organizing a panel of Subject Matter Experts (SME) to review the current flight training sequence and develop an alternate sequence to be used in an evaluation as stated in paragraph 1. (See Encl 4 for list of SMEs.)

c. The review of the Navy's rotary wing course POI proved to be of limited value. The Navy's course is established to serve as a transition course rather than an initial entry course. Students entering this course of instruction have already received approximately 100 hours of fixed wing flight instruction. Due to the difference in entry level requirements, the Navy's POI was not considered in the development of the alternate flight training sequence.

d. A synopsis of the current flight training sequence is included as Encl 2. The sequence described in the current Flight Training Guide is only a recommendation. The exact sequence is highly dependent on the personal preference of the instructor pilot and the student's ability. However, power-off maneuvers cannot be demonstrated until the fourth dual flight and students normally solo between the 12-14 hour level. These two factors are the major elements affected by the alternate flight training sequence.

e. The panel of SMEs developed three separate flight sequences. Each flight sequence varied the start point for emergency procedure training and solo flights.

The constraints for each flight sequence remained the same with the exception of the hour level at which emergency procedure training and solo flights were introduced. Some constraints were varied from the current Flight Training Guide to better enable implementation of the alternate sequencing. Only Chapter 2 of the current Flight Training Guide was affected.

f. The SME's then selected the most feasible flight sequence to evaluate the effects of sequencing emergency procedure training to a later flight hour level. The selection was based upon each flight sequence's suitability in the six areas listed below:

(1) Ability to implement the flight training sequence.

(2) Ability to produce valid data.

(3) Elimination/setback procedures.

(4) Safety.

(5) Civilian contractual arrangements.

(6) Airspace usage.

g. A report on the development of the alternate sequence was staffed through DTD, DOTD and OAP. Minor changes were incorporated in the sequence due to comments received during the staffing. The Commanding General and Deputy Commanding General of USAAVNC were briefed on the test sequence and its use in an evaluation as stated in paragraph 1. The Commanding General subsequently approved the evaluation using the developed test sequence on 18 Feb 83.

5. CONCLUSION. The test sequence (Encl 1) provides the most feasible alternative to evaluate the effects of sequencing emergency procedure training at a later flight hour level than programed in the current Flight Training Guide.

6. RECOMMENDATION. The test sequence be used in an evaluation to determine the effects of sequencing emergency procedure training at a later flight hour level.

Michael J. Juneau

MICHAEL J. JUNEAU
CPT, AR

4 Encl
1. Test Sequence
2. Current Flight Training Sequence
3. Comparison of Constraints of Current Sequencing with Test Sequence
4. SMEs

TEST SEQUENCE - EMERGENCY PROCEDURE MANEUVERS

TASK NO.	MANEUVER	DAY 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	- - - - - - 40
3-15	Hovering Auto												P				START SOLO										
3-16	Standard Auto												P														
3-22	Sim Eng Failure													P													
3-28	Antitorque Fail (Hover)															D											
3-29	Power Recovery														O					P							
3-32	Stand Auto w/Turn															O					P						
3-37	Termination w/Power																						O				

P - Perform
D - Demonstrate
O - Optional

CONSTRAINTS:

a. 50 Flt hours & 40 Days flt tng
Min of 35 hrs. dual
Min of 7 hrs. solo
Max of 15 hrs. solo
Solo NET hour level 16
Min of 44 hrs. before Eval ride
Min of 3 hrs. Tac tng

b. Emergency procedure maneuvers will not be performed until the 12 hour level.

c. Maneuver requirements: Proficiency of student based on IPs opinion. Student must meet current proficiency requirements prior to solo.

d. Maximum flight time per day:
Solo hrs. - 1.8
Total hrs. - 3.0

3. Tactical training maneuvers may be instructed as optional maneuvers during pre-solo.

NOTES:

1. All other items in the flight training guide will remain the same.

2. Student receives approximately 1 hour per day prior to solo. The day normally corresponds to the approximate hour level prior to solo.

3. Review previous procedures is conducted daily.

TEST SEQUENCE – OTHER MANEUVERS

TASK NO.	MANEUVER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	- - - - - - 40
3-1	Before Flight Check	P																									
3-2	Local Area Orientation	P																									
3-3	Flt Contrl & Ins Rel		P																								
3-4	Flt Controls		P																								
3-5	Straight & Level Flt		P																								
3-6	Level Turns		P																								
3-7	Hovering Flt			P																							
3-8	Normal Climbs			P																							
3-9	Normal Descents			P																							
3-10	Hovering Turns				P																						
3-11	Climb & Descend Turns				P																						
3-12	Decelerations				P																						
3-13	Takeoff to a Hover					P																					
3-14	Landing from a Hover					P																					
3-17	Normal Takeoff						P						START EPT				START SOLO										
3-18	Traffic Patterns						P																				
3-19	Normal Approach						P																				
3-20	Traffic Pattern Entry							P																			
3-21	Traffic Pattern Exit							P																			
3-23	Stagefield Go-around								P																		
3-24	Freq Chg Proc									P																	
3-25	Ground Taxi									P																	
3-26	Low RPM Recovery								P																		
3-27	Antioverspeed Device								P																		
3-30	Running Landing										P																
3-31	Sim Prec Lndg											P															
	App Termination Proc											P															
3-33	High Recon																				P						
3-33	Confined Areas Ops																				P						
3-33	Pinnacle/Ridgeline Ops																				P						
3-33	Slope Operation																				P						
3-34	Sim Max Perf Takeoff																			P							
3-35	Steep App to Ground																			P							
3-36	Quick Stop/Decel																					0					

CURRENT SEQUENCE - EMERGENCY PROCEDURE MANEUVERS

TASK NO.	MANEUVER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	DAY 16 *	17 *	18 *	19	20	21	22	23 *	24	25 *	- - - - - - 40
3-15	Hovering Auto					P											1	1									
3-16	Standard Auto					P											1	1									
3-22	Sim Eng Failure							P									1	1									
3-28	Antitorque Fail (Hover)										D																
3-29	Power Recovery										O									P							
3-32	Stand Auto w/Turn													O							P						
3-37	Termination w/Power																						O				

P - Perform
D - Demonstrate
O - Optional
* - Solo Flight

CONSTRAINTS:

a. 50 Flt hours & 40 Days flt tng
Min of 38 hrs. dual
Min of 7 hrs. solo
Max of 12 hrs. solo
Solo NLT 17.6 hours
Min of 44 hrs. before Eval ride
Min of 3 hrs. Tac tng after solo

b. Power-off man. will not be demonstrated until Day 4.

c. Power recovery NET Day 10 and NLT 1st dual flight after 2d supervised solo.

d. Pre-solo requirements:
15 standard auto's
5 hovering auto's
15 simulated engine failures

e. End of phase requirements:
5 hovering auto's
10 standard auto's
At least (1) standard auto or standard auto with turn and (1) simulated engine failure per dual flight.

NOTES:

1. Student receives approximately 1 hour per day prior to solo. The day normally corresponds to the approximate hour level prior to solo.

2. Review previous procedures is conducted daily.

3. Numbers indicated for day 16 and 17 indicate required maneuvers prior to 1st and 2d supervised solo flight.

ucl 2

CURRENT SEQUENCE – NORMAL AIRCRAFT MANEUVERS

TASK NO.	MANEUVER	DAY 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25 - - - - - - 40
3-1	Before Flight Check	P																								
3-2	Local Area Orientation	P																								
3-3	Flt Contrl & Ins Rel		P																							
3-4	Flt Controls		P																							
3-5	Straight & Level Flt		P																							
3-6	Level Turns		P																							
3-7	Hovering Flt			P																						
3-8	Normal Climbs			P																						
3-9	Normal Descents			P																						
3-10	Hovering Turns				F																					
3-11	Climb & Descend Turns				P																					
3-12	Decelerations				P																					
3-13	Takeoff to a Hover					P																				
3-14	Landing from a Hover					P																				
3-17	Normal Takeoff						P										3	3								
3-18	Traffic Patterns						P										3	3								
3-19	Normal Approach						P										3	3								
3-20	Traffic Pattern Entry					START EPT		P																		
3-21	Traffic Pattern Exit							P																		
3-23	Stagefield Go-around								P								1	1								
3-24	Freq Chg Proc									P							1	1								
3-25	Ground Taxi									P																
3-26	Low RPM Recovery									P							1	1								
3-27	Antioverspeed Device									P							D	D								
3-30	Running Landing											P														
3-31	Sim Prec Lndg													P												
	App Termination Proc													P												
3-33	High Recon																									
3-33	Confined Areas Ops																				P					
3-33	Pinnacle/Ridgeline Ops																				P					
3-33	Slope Operation																				P					
3-34	Sim Max Perf Takeoff																			P						
3-35	Steep App to Ground																			P						
3-36	Quick Stop/Decel																						O			

COMPARISON OF CONSTRAINTS OF THE CURRENT FLIGHT TRAINING SEQUENCE AND THE TEST SEQUENCE

ITEM	CURRENT	TEST
**NET EPT starting point	Day 4	F.H. 12
Solo time requirement (Hrs)	*NLT 17.6	**NET 16
Total flight time	50	50
Minimum dual time	38	35
Minimum solo time	7	7
Maximum solo time	12	15
Minimum time before evaluation ride	44	44
Minimum tactical training hours	3	3
Total Training days	40	40
Minimum maneuver requirements	Pre-solo: Std Auto - 15 Sim Eng Fail - 15 Hov Auto - 5 Post-solo: Std Auto - 10 Hov Auto - 5	Proficiency of student - based upon IPs opinion.

*NLT - Not Later Than
**NET - Not Earlier Than

ENCL 5

PANEL OF SUBJECT MATTER EXPERTS

NAME	GRADE	ORGANIZATION
HERALD, David A.	MAJ	Internal Evaluation, Directorate of Evaluation and Standardization
YONKERS, Leland N.	MAJ	External Evaluation, Directorate of Evaluation and Standardization
JUNEAU, Michael	CPT	External Evaluation, Directorate of Evaluation and Standardization
NOVOSEL, Michael J.	CW4	Directorate of Evaluation and Standardization
RALEY, Jerry	CW4	Contract Evaluation Branch, Hanchey Division
CARAM, Michael	CW2	Department of Flight Training
JOHNSON, John	DAC	Directorate of Training Developments
MORROW, Tom	DAC	Contract Evaluation Branch, Hanchey Division
SCHWAB, Harvey	DAC	Directorate of Evaluation and Standardization
STRAUSS, R.D.	CIV	Aviation Contract Employees, Inc.

ENCL 4

APPENDIX D

SAMPLE SELECTION PROCEDURES

ATZQ-ES-E 14 February 1983

MEMORANDUM FOR RECORD

SUBJECT: Sample Selection Procedures: Emergency Procedure Training Project

1. Definition: D-Day - Date class starts Primary Flight Training. References to D-Day only include training days.

2. The following steps will be followed for the sample selection:

a. Obtain class rosters NLT D-4.

(1) Commissioned Officers - 54th Co. (ensure they indicate section leaders.)

(2) Warrant Officer Candidates - 61st Co.

b. Contact ACE, Inc.'s Director of Primary Flight Training, Hanchey (598-6351) on D-4 to request the desired number of students in each section. Ensure the NATO students are always included in the total number of students required for Section 2.

c. Randomly select students for each section. The following constraints will apply to the selection process:

(1) Test section will always be Section 1.
Control section will always be Section 2.

(2) Ensure NATO students are always in the control section.

(3) Ensure AF students are always in the test group.

(4) Ensure the two designated section leaders from 64th Co are in different sections.

(5) Randomly select the remaining students ensuring an equal proportion of officers and warrant officer candidates are in each section and section size meets ACE's requirement.

(6) Last minute adjustments to section personnel will be made by ACE, Inc. as necessary to meet operational requirements. (These adjustments will normally be made on D-1 during the flight commander's briefing.)

3. Publish list of students for each section and distribute the list to the following organizations NLT D-3:

a. 6th Bn

b. 61st Co

c. 64th Co

d. Student Management Office (DOFT)

e. DOTD

f. ACE, Inc., Hanchey Division

4. On D+1 coordinate with ACE, Inc. on the last minute changes made to the roster. Update the roster and notify the above organizations.

5. Students that are setback will not be included in the sample and will always be setback to the control group.

Michael J. Juneau

MICHAEL J. JUNEAU
CPT, AR

APPENDIX E

TEST IMPLEMENTING INSTRUCTIONS

DIRECTORATE OF EVALUATION AND STANDARDIZATION
UNITED STATES ARMY AVIATION CENTER & FORT RUCKER
FORT RUCKER, ALABAMA 36362

ATZQ-ES-E   21 January 1983

SUBJECT: Letter of Instruction. Implementing procedures for a test to determine the effects of sequencing emergency procedure training to a later training day

1. Reference:

a. Flight Training Guide, Rotary Wing Aviator Course, Primary.

b. USAAVNC Supplement 1 to AR 95-1.

2. Purpose: To establish procedures to implement and conduct a test to determine the effects of sequencing emergency procedure training to a later training day.

3. Concept:

a. An alternate flight training sequence was developed by a panel of subject matter experts that delays the start of emergency procedure training. This alternate sequence will be used to determine if conducting emergency procedure training, after a student becomes more proficient in standard aircraft maneuvers, will reduce the iterations and time required to conduct emergency training.

b. The test of the alternate sequence will provide the data to evaluate the effects of delaying emergency procedure training. The test will involve three IERW classes with a total population of approximately 300 students. One section from each class will serve as a test group while the other section will be the control group. The test group will receive training using the test sequence (Encl 1) and the control group will receive training using current methods. The effectiveness of the alternate sequence will be determined by:

(1) Comparing the number of iterations required for a student to reach the proficiency standards, outlined in the Flight Training Guide, on emergency procedure maneuvers between the control group and the test group.

(2) Comparing student proficiency on emergency procedure maneuvers of the control group with that of the test group by evaluating the end-of-stage checkride performance on each emergency procedure maneuver.

(3) Comparing the overall proficiency of the control group with that of the test group by evaluating the end-of-stage checkride performance.

(4) Comparing the opinions of IPs on the management and administration of the test sequence with that of the current sequence.

(5) Comparing the hour level at which students are prepared for their end-of-stage evaluation checkride of the control group with that of the test group.

(6) Comparing the UH-1 contact phase checkride grades of the control group with that of the test group.

4. Procedures:

a. Selection of test group and control group: To insure the collection of valid data, DES will randomly select students for the test and control group and will provide the list to 61st Co, 64th Co, Student Management Office and ACE, Inc. ACE, Inc. can then assign students to IPs within their assigned group. This method will enhance the collection of valid data.

b. Conduct of training: The test group will receive training using the alternate sequence (Encl 1) and the control group will receive training using the current Flight Training Guide sequence. Both groups will receive training using the established flight instruction methods, on the same maneuvers and to the same standards as currently programed. The only changes to the current Flight Training Guide for the test sequence are indicated below:

ITEM	CURRENT	TEST SEQUENCE
**NET EPT starting point	Day 4	Flt Hr 12
Minimum dual flight hours	38	35
Maximum solo hours	12	15
Solo requirement (Hrs.)	*NLT 17.6	**NET 16.0
Minimum maneuver requirements	Pre-solo: Std Auto-15 Sim Eng Fail-15 Hov Auto-5 Post-solo: Std Auto-10 Hov Auto-5	Proficiency of student-based upon IPs opinion Student must meet current proficiency standards to solo.

*NLT - Not Later Than
**NET - Not Earlier Than

c. Data collection: Data will be collected through three separate instruments to evaluate the alternate sequence in the areas indicated in para 3b.

(1) Primary Flight Training Daily Record (see enclosure 2.)

(a) IPs will circle the cumulative number of iterations for each maneuver in the cumulative block on the date the student can pass the end-of-stage evaluation (70%) in that maneuver.

(b) IPs will draw a thick black vertical line after the date he feels the student can pass (70%) the end of stage evaluation.

(c) IPs will draw a DASHED line after the date a student reaches "SOLO" proficiency on normal maneuvers only.

(d) IPs will draw a DOTTED line after the date a student reaches "SOLO" proficiency on all pre-solo maneuvers.

(e) IPs will indicate in the upper right hand corner the amount of flight time the student has had prior to starting IERW.

(2) IP Questionnaire: DES will administer a questionnaire to the test group IPs to collect data on their opinions of the alternate sequencing.

(3) Grade Slips:

(a) The CEB end-of-stage evaluations will be used to compare students performance on emergency procedure maneuvers and their overall proficiency during the primary phase of IERW. The overall grade as well as the numerical score for each maneuver will be used in the analysis. This provides a much greater scoring range and incorporates a weighted score for each maneuver.

(b) The end-of-stage UH-1 contact phase grades will be used to compare performance during the contact phase and determine if sequencing of emergency procedures training in primary affects the later development of the student.

d. Evaluations: Both groups will receive the same evaluations using current procedures.

e. Setbacks/Eliminations:

(1) CEB will establish alternate procedures for students in the test group.

(2) Students setback from other classes or from the test group will be placed in the control group only.

f. Upon completion of Primary, DES will coordinate with DOFT for data required from the Primary Flight Training Records.

ATZQ-ES-E 21 January 1983
SUBJECT: Letter of Instruction

g. Briefings:

(1) Instructor Pilots: DES, in conjunction with Hanchey Division, DOFT, will coordinate with ACE, Inc to thoroughly brief all IPs involved in the test.

(2) Students: DES will brief students on test procedures and objectives during the scheduled flight commander briefing.

Michael J. Juneau

2 Encl
as

MICHAEL J. JUNEAU
CPT, AR

ENCL 1 - TEST SEQUENCE (OMITTED)

SEE APPENDIX C, ENCL 1

PRIOR FLIGHT TIME 35 HRS.

PRIMARY FLIGHT TRAINING DAILY RECORD

NAME Hotshot, Thomas A RANK 1LT CLASS 83-95

DATE	3 Jan	4	5	6	7	10	11	12	13	14	17	18
JULIAN	003	004	005	006	007	010	011	012	013	014	[illegible]	[illegible]
TNG DAY	1	2	3	4	5	6	7	[illegible]	9	10		[illegible]
GRADE		B	B	B	WX	F	[illegible]	F		[illegible]	[illegible]	[illegible]
TIME DUAL	1.0	1.0	1.1	1.2		1.[illegible]	1.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CUM DUAL	1.0	2.0	3.1	4.3	4.3	[illegible]	6.[illegible]	7.[illegible]	8.6	[illegible]	10.6	[illegible]
TIME SOLO												
CUM SOLO												
TOTAL TIME	1.0	2.0	3.1	4.9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9.7	10.5	[illegible]
HOVER AUTO												
CUM												
STD AUTO												
CUM												
STD AUTO W/TURN												
CUM												
SIM ENG FAILURE												
CUM												
POWER RECOVERY												
CUM												

Draw a DASH line after the date a student reaches "SOLO" proficiency on normal maneuvers only.

Circle cumulative number when a student can pass (70%) the end of stage evaluation in that maneuver.

DATE	19	20	21	24	[illegible]	25	26	27	27	28	[illegible]	31
JULIAN	019	020	021	024	[illegible]	[illegible]	026	027	[illegible]	[illegible]	[illegible]	031
TNG DAY	13	14	15	16	17	17	18	19	19	[illegible]	20	21
GRADE							B	B		B		WX
TIME DUAL							1.5	1.2		1.[illegible]		
CUM DUAL					[illegible]	17.4	18.7	19.9	[illegible]	[illegible]	21.1	21.1
TIME SOLO						1.5			[illegible]		1.5	
CUM SOLO						[illegible]		.6	[illegible]	1.0	2.5	2.5
TOTAL TIME	13.[illegible]	14.1	15.1	[illegible]	17.4	[illegible]	19.[illegible]	20.4	[illegible]	[illegible]	23.6	23.[illegible]
HOVER AUTO	2	2	2				1	1				
CUM	2	4	6		7		8	[illegible]		8		
STD AUTO	2	2	2	3	2		2	2		1		
CUM	2	4	6	9	11		13	15		1[illegible]		
STD AUTO W/TURN			1				1					
CUM			1				2			4		
SIM ENG FAILURE	2	2	2	2	2		2	2		1		
CUM	2	4	6	8	10		12	[illegible]		15		
POWER RECOVERY		1		1	1					1		
CUM		1		2	3					4		

Draw a DOTTED line after the date a student reaches "SOLO" proficiency on all pre solo maneuvers.

DATE	1 Feb	2	3	4	4	7	8	9	10	13	14	14
JULIAN	[illegible]	033	034	035	035	039	039	040	041	044	045	045
TNG DAY	22	23	24	[illegible]			27	28	29	30	31	[illegible]
GRADE							MD		[illegible]	E		B
TIME DUAL									1.8	1.7		1.3
CUM DUAL							27.5	27.5	29.3	31.0	31.0	32.3
TIME SOLO								1.8			1.7	
CUM SOLO					[illegible]	3.4	3.9	7.7	7.7	7.7	9.4	9.4
TOTAL TIME			28.[illegible]	30.1	31.[illegible]	33.4	33.4	35.[illegible]	37	38.7	40.4	41.7
HOVER AUTO			1			1				2		
CUM			11			12				14		
STD AUTO	1			1		2			1			
CUM	17			18		20			21			
STD AUTO W/TURN			2								2	
CUM			6								8	
SIM ENG FAILURE	2			2					2	1		
CUM	17			19					21	22		
POWER RECOVERY	2					1			2			
CUM	6					7			9			

Draw a thick vertical line after the date a student can pass (70%) the end-of-stage evaluation.

Student (Signature) IP (Signature)

INCL 2

APPENDIX F

IP QUESTIONNAIRE

UNITED STATES ARMY AVIATION CENTER
FORT RUCKER, ALABAMA

SEQUENCING OF EMERGENCY PROCEDURE TRAINING EVALUATION
INSTRUCTOR PILOT QUESTIONNAIRE

NAME ______________________

FLIGHT ______________________

DIRECTORATE OF EVALUATION AND STANDARDIZATION

DATA REQUIRED BY THE PRIVACY ACT OF 1974
(5 U.S.C. 552a)

TITLE OF FORM	PRESCRIBING DIRECTIVE
QUESTIONNAIRE FOR IERW PRIMARY PHASE INSTRUCTOR PILOTS	AR 611-3

1. AUTHORITY

Section 301 Title 5 USC

2. PRINCIPAL PURPOSE(S)

To obtain information for evaluating Aviation Center Training Programs.

3. ROUTINE USES

1. To determine the effects on student proficiency of sequencing emergency procedure training at a later training day than programmed in the current Flight Training Guide.

2. To evaluate the Aviation Center's Training effectiveness.

4. MANDATORY OR VOLUNTARY DISCLOSURE AND EFFECT ON INDIVIDUAL NOT PROVIDING INFORMATION

Voluntary, however, failure to disclose all or part of the requested information will significantly impair the ability to monitor and maintain effective and efficient instruction. Cooperation in completing this survey is essential.

FORM · Privacy Act Statement - 26 Sep 75

Introduction. The Directorate of Evaluation and Standardization is in the process of conducting an evaluation of the sequencing used to teach emergency procedure training during the Initial Entry Rotary Wing (IERW) Course. The goal of this evaluation is to determine the effects on student proficiency of sequencing emergency procedure training to a later training day.

All instructor pilots involved in the evaluation will be administered the survey. The results will be compiled with other data to determine the stated goal.

All of your responses will be held in the strictest confidence. Any specific comments, recommendations, or criticisms you make will not be released to anyone outside the Evaluation Division, DES.

Instructions. This survey is designed to obtain comments concerning your last flight training class. The following procedures apply for completion of the survey:

1. Fill in your name and flight on the survey cover.

2. Questions 1 through 8 are fill in the blank. Please answer as accurately as possible.

3. All remaining questions are followed by a number of responses. Circle only the one response which most closely reflects your opinion of the subject.

4. You may elaborate on any of your responses by writing your comments in the blank areas of the survey.

Thank you for your help.

1. How many months have you been a Primary Phase IP?

_______________ months

2. What is your total flight time (IP, pilot and copilot only)?

_______________ hours

3. What is your total IP flight time?

_______________ hours

4. What is your total instructor pilot flight time in the IERW Primary Phase?

_______________ hours

5. Given current flight training guide constraints (i.e., 44 hours before evaluation, 40 training days, solo and dual time) what do you feel is the optimum hour level for starting emergency procedure training?

_______________ hour level

6. Given a 50 hour training syllabus without any other constraints, what do you feel is the optimum time to introduce emergency procedure training if you are required to train all the maneuvers to the standards stated in the flight training guide?

_______________ hour level

7. In order to meet course requirements during a 40 day training cycle, (disallowing weather and maintenance days) emergency procedure training should start NO LATER than the:

_______________ hour level

8. The latest I can delay the first supervised solo and still meet course requirements is the:

_______________ hour level

9. During this last training sequence, it was _____ to meet the programmed flight requirements. (Minimum dual and solo flight hours; required iterations.)

   (1) Very difficult
   (2) Somewhat difficult
   (3) Fairly easy
   (4) Very easy

10. During this last training sequence, I had _____ time to meet my required dual flight requirements.

   (1) Much more than enough
   (2) Adequate
   (3) Hardly enough

11. How often did you have trouble with stagefield lane availability while training your last class?

   (1) Always
   (2) Usually
   (3) Sometimes
   (4) Infrequently
   (5) Never

12. The training program I followed for the last class caused me to spend _____ teaching emergency procedure maneuvers.

   (1) A great deal more time than usual
   (2) More time than usual
   (3) About the same time as usual
   (4) Less time than usual
   (5) A great deal less time than usual

13. The training program I followed for this last class caused me to spend _____ teaching emergency procedure maneuvers.

   (1) A great deal more effort than usual
   (2) More effort than usual
   (3) About the same effort as usual
   (4) Less effort than usual
   (5) A great deal less effort than usual

APPENDIX G

IP SURVEY RESPONSES

INSTRUCTOR PILOT SURVEY RESPONSES

NOTE: Questions 1-9 represent the average response for each group. The number in parenthesis for questions 9-18 represent the number of IPs responding in that area.

NOTE: The exact wording for each question can be found in Appendix E.

	TEST GROUP	CONTROL GROUP
1. Months as a Primary Phase IP	59.8	43.3
2. Total Flight Time	6148.8 hrs	6649.4 hrs
3. Total Instructor Pilot Time	3643.9 hrs	3618.1 hrs
4. Total IP Time in Primary	2531.6 hrs	2008.4 hrs
5. Optimum Time to Start EPT with FTC Constraints	6.95 hrs	6.8 hrs
6. Optimum Time to Start EPT in a 50-hour Syllabus without other constraints	7.02 hrs	7.2 hrs
7. NLT EPT start time to complete required training	7.9 hrs	7.97 hrs
8. NLT solo time to complete required training	16.7 hrs	16.4 hrs
9. Ability to meet programed requirements:		
Difficult	73.6% (39)	51.8% (28)
Easy	26.4% (14)	48.2% (26)
10. Allotted time to meet required dual flight time:		
Much More Than Enough	3.8% (2)	1.9% (1)
Adequate	53.8% (28)	68.5% (37)
Hardly Enough	42.4% (22)	29.6% (16)
11. Problems with stagefield lane availability:		
Often	49.0% (26)	26.0% (14)
Sometimes	41.5% (22)	50.0% (27)
Seldom	9.5% (5)	24.0% (13)
12. Time spent teaching EPT:		
More Than Usual	19.2% (10)	7.4% (4)
About the Same	46.2% (24)	88.9% (48)
Less Than Usual	34.6% (18)	3.7% (2)

	TEST GROUP	CONTROL GROUP
13. Effort spent teaching EPT:		
More Than Usual	42.3% (22)	9.2% (5)
About the Same	30.8% (16)	85.2% (46)
Less Than Usual	26.9% (14)	5.6% (3)

TEST GROUP IPs ONLY

	TEST GROUP
14. Student pilot safety:	
Enhanced	15.4% (8)
About the Same	28.8% (15)
Suffer	55.8% (29)
15. Modification to flight instruction methods required:	
Yes	60.8% (31)
No	39.2% (20)
16. Identification of weak students:	
Earlier	5.7% (3)
About the Same	24.5% (13)
Much Later	69.8% (37)
17. Spending 12 hours on normal maneuvers before starting EPT was:	
Too Short	1.9% (1)
Sufficient	26.9% (14)
Too Long	71.2% (37)
18. Delaying EPT will reduce time required to teach EPT:	
Yes	50.9% (27)
No	49.9% (26)

APPENDIX H

DISCRIMINANT ANALYSIS PARAMETERS

DISCRIMINANT ANALYSIS PARAMETERS

Variable Selection Procedure	Stepwise
Selection Rule	Minimize Wilks' lambda
Maximum Steps	27
Minimum Tolerance Level	0.001
Minimum F to Enter	1.000
Maximum F to Remove	1.000
Maximum Number of Discriminant Functions	1
Minimum Cumulative Percent of Variance	100.0
Maximum Significance of Wilks' Lambda	1.000

The Stepwise Variable Selection Procedure chooses variables, one at a time, for inclusion in the equation based upon their combined ability to discriminate between groups. The most discriminating variable is selected first under this technique, followed by the next best discriminator, followed by the next, and so on, until the selection specification is no longer met.

The Wilks' lambda statistic, which served as the selection rule, is a multivariate counterpart to the univariate One-Way Analysis of Variance test. It is defined by the formula:

$$\Lambda = \frac{|S_E|}{|S_H + S_E|}$$

Where S_E is the Sums of Squares and Cross Products matrix for error and S_H is the Sums of Squares and Cross Products matrix for the hypothesis:

$$\mu_1 = \mu_2 = \cdots = \mu_g = \cdots = \mu_G$$

Where each μ_g is a vector of means, otherwise known as a group centroid.[1] The procedure used in the discriminant analysis of Primary Phase maneuvers made stepwise selections of the variable (from all that were not already in the equation) that produced the smallest Wilks' lambda and added a significant amount of centroid separation to that accounted for by variable(s) already in the equation.

[1] Green, P.E., Analyzing Multivariate Data, Dryden Press: Hinsdale, IL, 1978.

The criterion for significance was an F value of 1.000, which is the default value for this statistic in the analysis package that was used.[2] An F value of 1.000 is always associated with a significance level of 0.50. Such a criterion is quite liberal for accepting and maintaining discriminating variables in the equation, but was deemed acceptable in light of the intent of the analysis, i.e., to determine if delayed emergency procedure training affected performance on specific maneuvers taught in Primary Phase of IERW. As it turned out, all F values for the variables selected for the equation were well above the criterion value. The lowest F approximation that was encountered was just over 2.8 with 7/92 degrees of freedom.

The maximum number of functions that could be computed with the two groups was one. The equation, therefore, developed much like a multiple regression equation and was interpreted in a similar manner.

[2] Nie, N.H., Hull, C.H., Jenkins, J.G., Steinbrenner, K., and Brent, D.H., Statistical Package for the Social Sciences, McGraw-Hill, 1975.

APPENDIX I

LIST OF ACRONYMS

LIST OF ACRONYMS

ACE	Aviation Contractor Employees
CEB	Contract Evaluation Branch
CG	Commanding General
DES	Directorate of Evaluation and Standardization
DOFT	Department of Flight Training
DOTD	Directorate of Training and Doctrine
DTD	Directorate of Training Development
EPT	Emergency Procedure Training
FTG	Flight Training Guide
IERW	Initial Entry Rotary Wing
IP	Instructor Pilot
NET	Not Earlier Than
NLT	Not Later Than
OAP	Office of Accident Prevention
ORWAC	Officer Rotary Wing Aviator Course
POI	Program of Instruction
SME	Subject Matter Expert
USAAVNC	US Army Aviation Center
WORWAC	Warrant Officer Rotary Wing Aviator Course

APPENDIX J

DISTRIBUTION LIST

DISTRIBUTION

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